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TITLE: Vitamin D Supplementation for Prevention of Post-Traumatic Osteoarthritis:
Evaluation in Animal and Clinical Models

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CONTRACTING ORGANIZATION: University of Connecticut
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Abstract

The goals of this translational study are to create an animal model of joint injury and evaluate the impact of Vitamin D in prevention and progression of PTOA. Concurrently, we will evaluate a clinical cohort of USMA cadets treated for ACL tear, with pre- and post-injury serum 25-hydroxy-Vitamin D levels and correlation with joint space narrowing and biomarkers of cartilage injury. If Vitamin D supplementation can prevent the onset of often rapid joint destruction that occurs with PTOA, this simple, safe, and inexpensive intervention could potentially translate to pre-emptive treatment for high-risk military occupations. In addition, Vitamin D could be used at the time of injury to possibly mitigate ongoing articular cartilage damage.

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Introduction

The purpose of this study is to create an animal model of joint injury and evaluate the impact of Vitamin D supplementation in prevention and progression of post-traumatic osteoarthritis (PTOA). Concurrently, this funding supports an add-on study at the United States Military Academy, to evaluate a clinical cohort of USMA cadets treated for anterior cruciate ligament (ACL) tear, with pre- and post-injury serum 25-hydroxy-Vitamin D levels and correlation with joint space narrowing and biomarkers of cartilage injury. If Vitamin D supplementation can prevent the onset of often rapid joint destruction that occurs with PTOA, this simple and safe intervention could potentially translate to pre-emptive treatment in high-risk military occupations. In addition, Vitamin D could be used at the time of injury to possibly mitigate ongoing articular cartilage damage.

Keywords

Murine, post-traumatic osteoarthritis, military, ACL, knee, medial meniscus, femoral, tibial, 25-hydroxy-Vitamin D, supplementation

Overall Project Summary

This report represents the second annual summary of work for the 2015-16 year of funding for this project. Reporting will be organized by task as noted in the Statement of Work.

Specific Aim 1: to evaluate the impact of systemic Vitamin D supplementation on the initiation and development of surgically induced OA in a murine model

*Objectives: Vitamin D Supplementation and Rodent Surgery
Imaging/Tissue Analysis of Surgical Model*

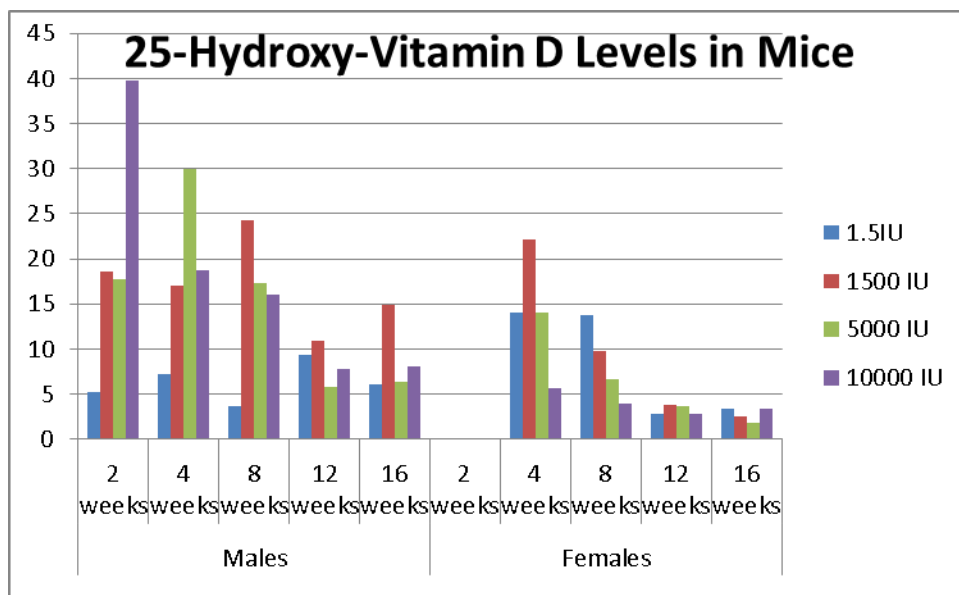
Progress

- We have completed the all three rounds of animal experimentation with C57-BL6 mice fed to supplement with four levels of Vitamin D:
 - control (1.5 IU/kg - minimal Vitamin D)
 - 1500 IU/kg (normal dietary level of Vitamin D)
 - 5000 IU/kg
 - 10,000 IU/kg
- A total of 300 mice underwent surgical initiation of osteoarthritis using destabilization of the medial meniscus and MCL sectioning.¹ Small subgroups were treated with anterior cruciate ligament (ACL) sectioning to evaluate the degree of osteoarthritis induction.
- We changed the timepoints to evaluate mice at 8,12,16, and 20 weeks as we noted minimal induction of osteoarthritis at 4 and 8 weeks.
- Initial testing using mouse Vitamin D ELISA confirmed graduated levels of Vitamin D in the sera of treated mice groups.

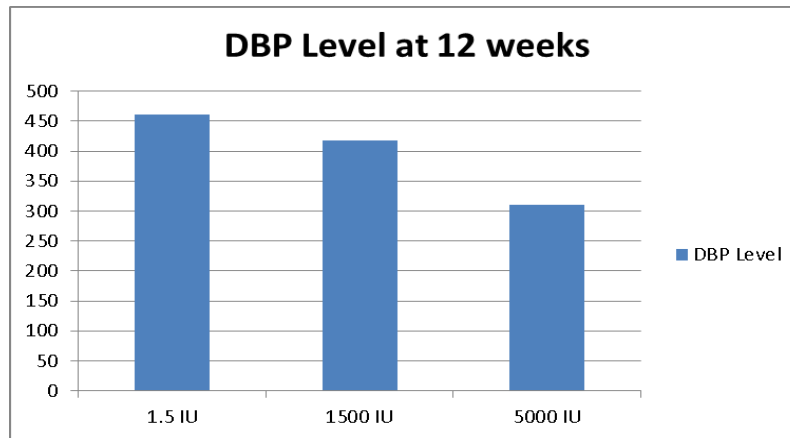
- We then performed histology, faxitron Xray imaging, and selected micro-CT analysis of the murine knees.
- A group of experienced animal histology investigators performed a blinded rating of the degree of osteoarthritis of the murine knee histology using the Glasson scale, for rounds 1 and 2 of murine experimentation.

Results

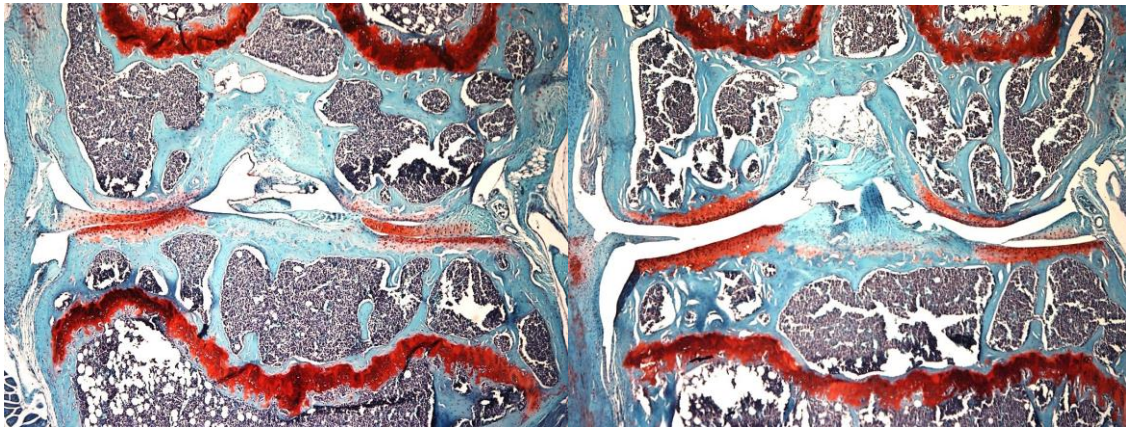
- Using ELISA, we evaluated differential levels of circulating 25-hydroxy-Vitamin D in each of the 4 groups of mice fed different levels of Vitamin D over time, and noted initial increase in circulating 25-hydroxy-Vitamin D levels that differed by feeding dose, with metabolic equilibration over time. While high doses of Vitamin D have been previously shown to be well-tolerated in mice,³ the findings of metabolic equilibration over time have not been previously reported. In males, the dose-response from minimal to high levels was shown best at 2 and 4 weeks; we did not have data on females in this group at 2 weeks.



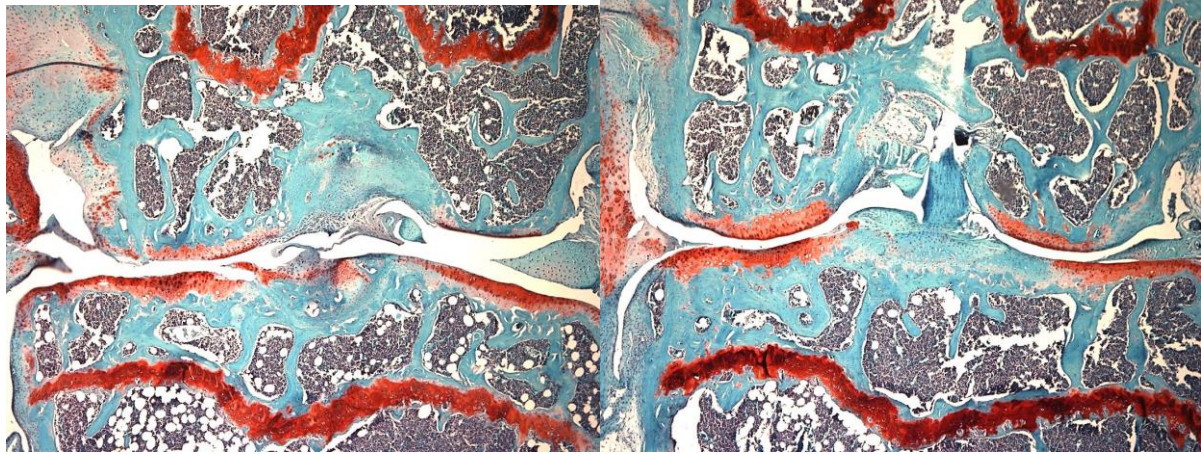
- We also tested Vitamin-D binding protein (DBP), which binds Vitamin D metabolites in plasma up to a certain species-specific level. It has been shown that free Vitamin D metabolites are active, and thus once DBP binding is maximized, the free metabolite levels will increase.⁴ Our results showed the highest levels of DBP in the mice given minimal Vitamin D, with DBP decreasing as supplementation increased.



- In analysis of the histology from round 2, performed by the same three blinded examiners for consistency, we noted improved consistency of arthritic change at the 8, 12, 16, and 20 week timepoints. Histological analysis again showed some evidence in female mice of mitigation of post-traumatic osteoarthritis in the ACL group, as well as in females at 12 weeks, but no trends in male mice.



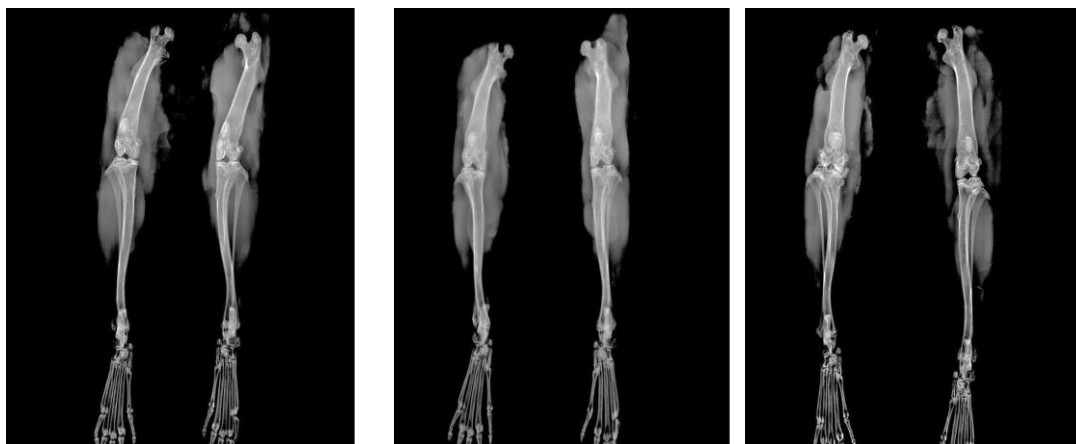
On the left, 20-week female with 0 Vitamin D supplementation with thinned cartilage and joint narrowing. On the right, female with 5000IU/kg supplementation, showing normal staining of the cartilage with less articular change. Note that in both, tibial squaring and osteophyte is visualized.



20 week histology samples from male mice with 5000 IU/kg Vitamin D. Note osteoarthritic changes on the left, with lesser changes on the right. Supplementation again seems to be more effective in female sex of mice.

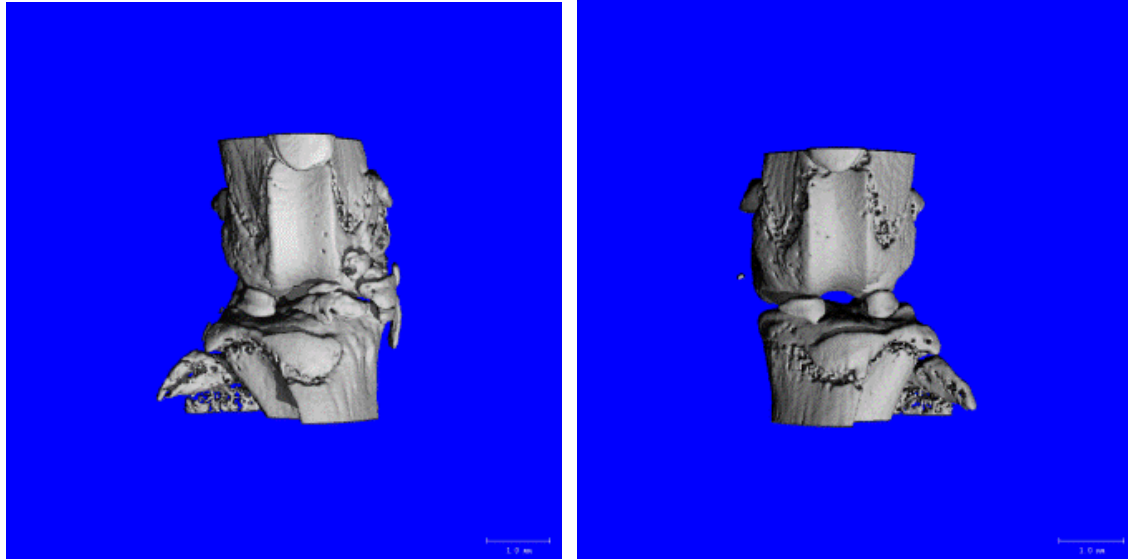
- We completed the third round of murine surgery and murine sacrifice at 20 weeks just before the PI's institutional move from the University of Connecticut to the University of Chicago, while micro-CT analysis began for the round 2 mice. Micro-CT analysis is ongoing for the 12, 16, and 20 week timepoints of round 2, with measurement of subchondral bone volume and osteophyte counts. Histological analysis and micro-CT of round 3 murine specimens is beginning.

Faxitron imaging showed progressive signs of osteoarthritis over time.

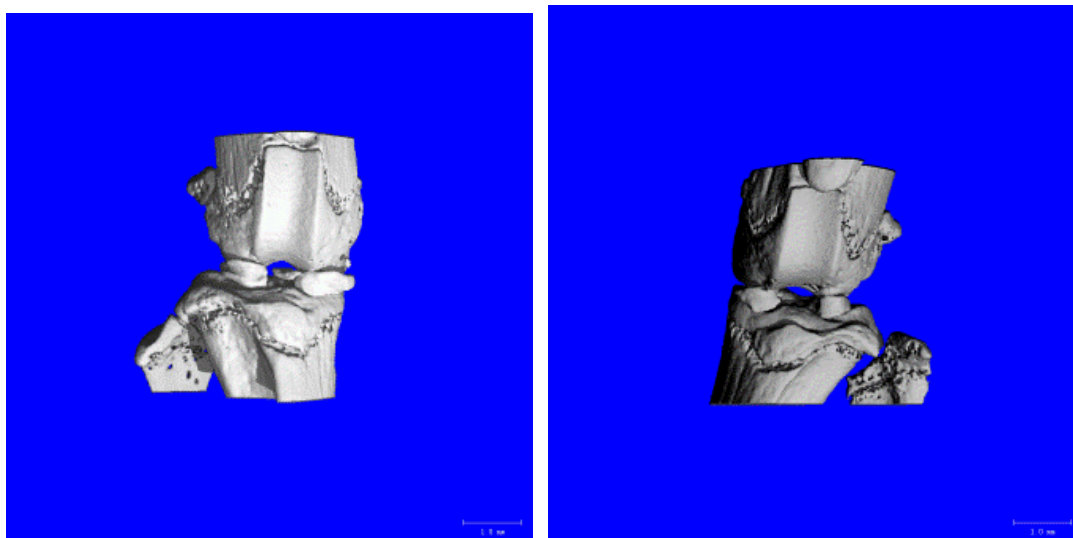


8, 12, and 16 week views with DMM (surgical) limb on left, sham surgery on right; all are of male mice with 1500 IU (normal) feed levels.

Micro-CT analysis has similarly shown signs of progressive osteoarthritis with aging in the murine model. Because micro-CT was to be performed in the 2nd and 3rd rounds, we only have completed data from the 2nd round. The third round analysis is pending funding transfer to set up a subaward to complete the work.

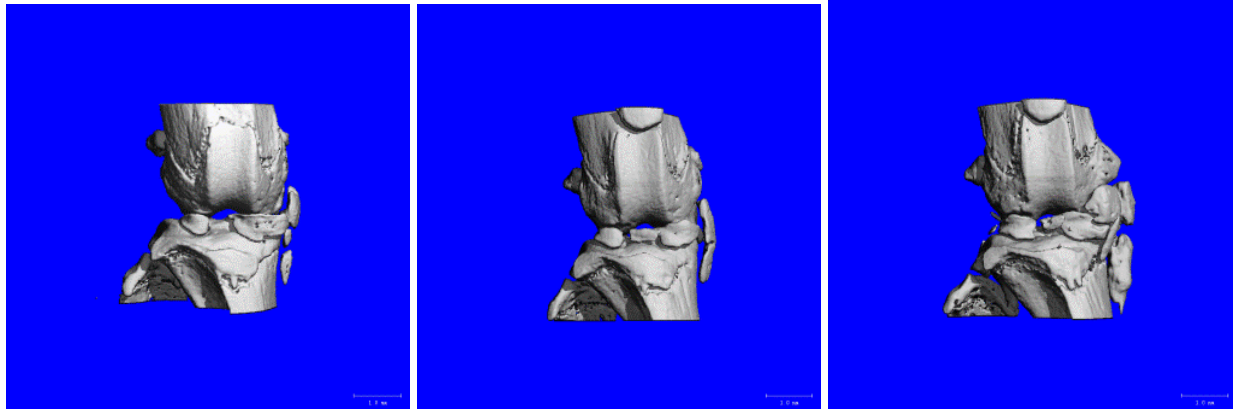


Above, 12 week female murine knees with 1.5U/kg (minimal) Vitamin D supplementation. The right knee (above on left) is the operative knee with induced osteoarthritis, compared to the sham surgery left knee of the same mouse.



This is compared to a 12 week male murine knee image, with supplementation of 10,000 IU/kg Vitamin D. Note the lack of osteophyte formation on the operative right knee (above, left).

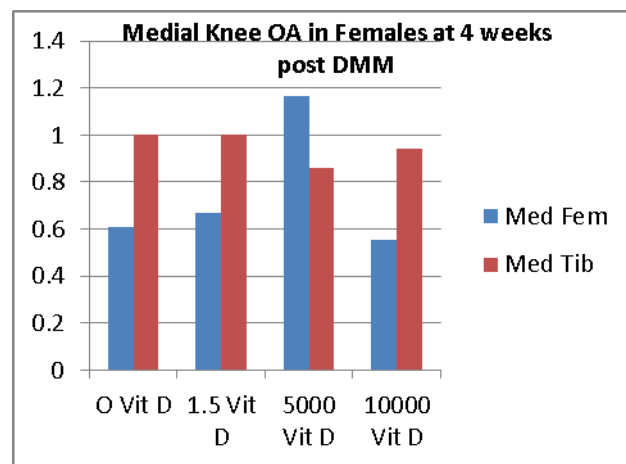
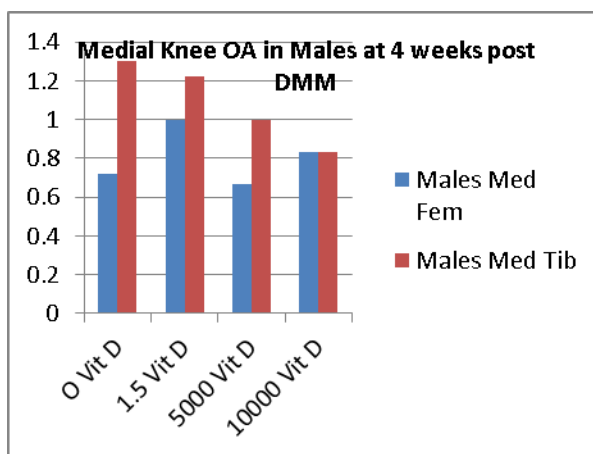
At 20 weeks, we begin to see more osteoarthritis in general. Below, left is a female fed 10,000 IU/kg of Vitamin D; in the middle, one fed 5,000 IU/kg. On the right, a female fed normal levels (1500 IU/kg Vitamin D).



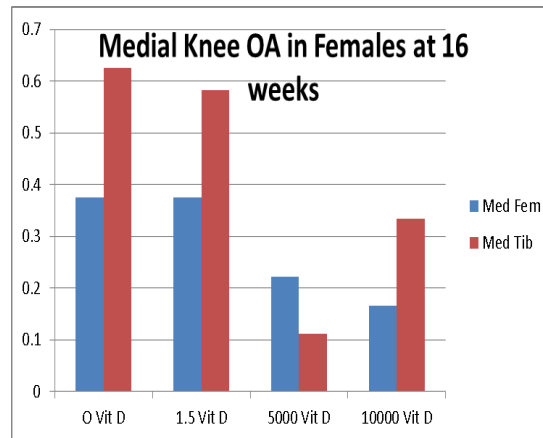
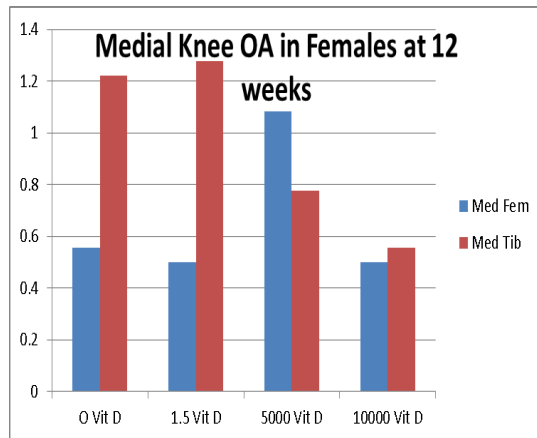
The results of the micro-CT are suggestive, but not confirmatory, that there is some impact of increased Vitamin D supplementation, with fewer signs of joint degeneration seen on radiography and micro-CT. However, analysis will include pooled data from rounds 2 and 3 with measurement of osteophyte volume.

Histology analysis is ongoing, with the first two rounds showing promising data. A group of three experienced investigators rated histology slides in a blinded fashion using the Mankin scoring system for severity of murine joint osteoarthritis, with the findings of:

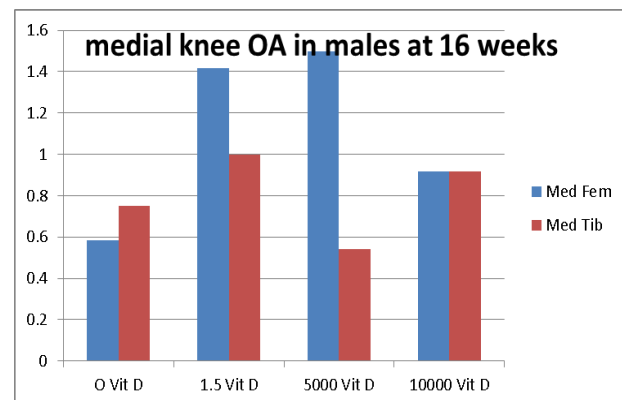
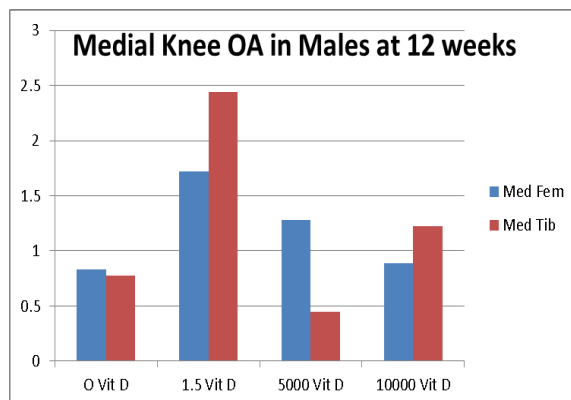
- Overall minimal induction of osteoarthritis in the earlier timepoints
- No correlation between Vitamin D supplementation and osteoarthritis in male or female mice at 4 or 8 weeks.



- In female mice at 12 and 16 weeks, ratings showed decreased OA histologically on the tibial side at 12 weeks and on both the tibial and femoral sides at 16 weeks.



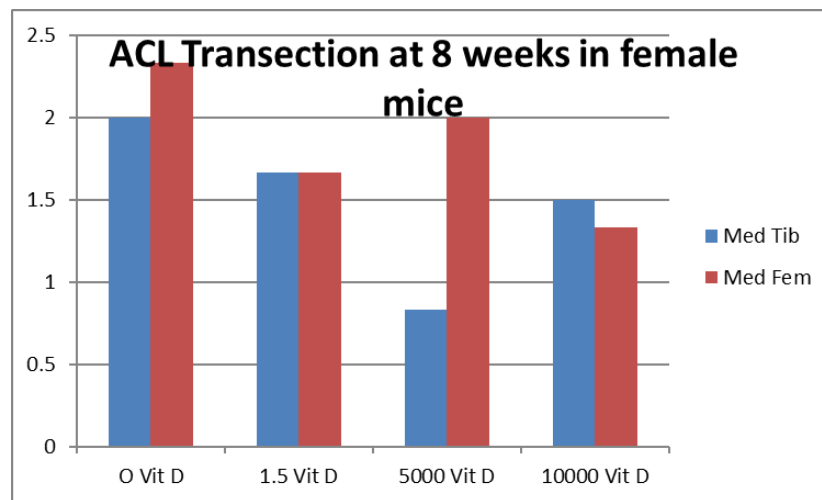
- We did not observe this effect in male mice, as shown below:



In a subset of mice treated with ACL transection in combination with destabilization of the medial meniscus, we observed faster onset and more severe osteoarthritic changes. Note the near complete loss of cartilage on the left side of the knee, with fibrillation and displacement of the meniscus.



Evaluation of these mice showed a protective effect of Vitamin D supplementation, although all of these mice developed osteoarthritis at 8 weeks. However, there was a trend toward less severe involvement in the supraphysiologically dosed female mice, as shown below.



Accomplishments

- Completed animal surgeries and round 2 of histology.
- Established reliable histology ratings techniques using Mankin scoring rubric.
- Showed early correlative findings of protective effect of Vitamin D using Faxitron Xray and micro-CT.
- We have some exciting potential evidence of Vitamin D mitigation of OA in female animals.

Challenges

- Transfer of grant funding from the University of Connecticut to the University of Chicago.

Specific Aim 2: To evaluate the serum 25-hydroxy-Vitamin D status of military cadets before and after ACL injury and reconstruction and correlate these findings with biomarkers of articular cartilage injury as well as radiographic joint space narrowing

Objectives: Initiation of Add-on to Existing Study

Subject Enrollment/Specimen and Data Collection

Progress

- We obtained Keller Army Hospital and UConn Institutional Review Board (IRB) approval in October 2014 to add-on to the existing study of ACL tears in United States

Military Academy (USMA) cadets and biomarkers for initiation of PTOA. Our IRB approval allows us to also measure 25-hydroxy-Vitamin D levels in pre-injury, at-injury, at-surgery, and post-surgical serum samples from USMA subjects.

- To date, study participation is as follows per Dr. Cameron (USMA PI):
 - 88 ACL injured cadets screened
 - 55 ACL injured cadets enrolled in study; this is on target for 90-100 cadets to be enrolled over three years.
 - Matched control subjects are also enrolled for each ACL injured case.
- We will not perform Vitamin D testing until we have reached target enrollment, both for reliability of testing (batched testing is much more comparable) and budget costs.

Results/Accomplishments reporting is deferred pending further enrollment for this segment of the study.

Problems/Changes

- With the change in institution and delay in funding transfer, completion of histology and rating for round 3 of animal surgery is not finished.
- Immunohistochemistry of murine knees, similarly, has not begun pending funding.
- It is anticipated that a no-cost extension may be necessary.

Key Research Accomplishments

- The main accomplishment is the preliminary finding of a correlation between increased Vitamin D supplementation and decreased OA histologically in the murine model. It is interesting to note that this was only seen in females, implying a possible sex-differential effect. Van Grootheest et al showed in a recent epidemiological study in the Netherlands that circulating Vitamin D levels were higher in women than men, particularly in the group under 35 years.⁵ In contrast, Rabenberg et al showed no sex differences in 25-hydroxy-Vitamin D levels in an adult census study.⁶ In our second round of the animal study, this appeared to be a consistent effect.

Conclusion

This combined animal and clinical study is making progress in both focus areas. We have successfully induced post-traumatic osteoarthritis in murine knees, and have demonstrated that we can effectively supplement mice with dietary Vitamin D in varying doses. Additionally, we have obtained some interesting preliminary evidence that Vitamin D in supraphysiologic doses mitigates the degree of PTOA in female animals. We are analyzing data from micro-CT, further histology, and X-ray, and will be starting immunohistochemical work shortly, pending finalization of grant funding transfer to the University of Chicago.

Our add-on to the clinical study has been successful thus far and enrollment continues. Over half of subjects have been enrolled. Data from these subjects will be available for analysis once we perform batched serum Vitamin D testing, at the end of enrollment.

Publications, Abstracts, and Presentations - Nothing to report

Inventions, Patents, and Licenses – Nothing to report

Reportable Outcomes – Nothing to report

Other Achievements - Nothing to report

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Appendix

- PI CV
- Relevant clinical research from PI – recent publication about Vitamin D and bone turnover levels in patients with distal radius fractures

CURRICULUM VITAE

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EDUCATION

- 1987-1991 University of Maryland
College Park, MD
B.A., *magna cum laude* with General Honors
- 1991-1996 University of Pennsylvania School of Medicine
Philadelphia, PA
M.D., May 21, 1996

POST-DOCTORAL EDUCATION

- 1996-1997 Brown University Department of Surgery - **Internship**
Providence, RI
Director: Kirby I. Bland, MD
- 1997-2001 Brown University Department of Orthopaedic Surgery-**Residency**
Providence, RI
Director: Michael G. Ehrlich, MD
- 2001-2002 Brown University Division of Orthopaedic Trauma, Department
of Orthopaedics – **Orthopaedic Trauma Fellowship**
Providence, RI
Director: Peter G. Trafton, MD
- 2002-2003 Mayo Clinic Division of Hand Surgery, Department of
Orthopaedics – **Hand Surgery Fellowship**
Rochester, MN
Director: Robert D. Beckenbaugh, MD/Richard A. Berger, MD, PhD

CERTIFICATION

- 2005/2013 Board Certified (Diplomate) - American Board of Orthopaedic Surgery
(Chicago, Illinois)
- 2006/2013 Certificate of Added Qualification (Hand Surgery) - American Board of
Orthopaedic Surgery (Chicago, Illinois)

LICENSURE

Licenses active in Connecticut, Colorado, Minnesota, Illinois and Georgia

ACADEMIC APPOINTMENTS

2003 – 2009 Assistant Professor, Department of Orthopaedic Surgery
University of Colorado Health Sciences Center
2009-2010 Associate Professor, Department of Orthopaedic Surgery
University of Colorado-Denver
2010-2015 Associate Professor, Department of Orthopaedic Surgery
University of Connecticut
2015-2016 Professor, Department of Orthopaedic Surgery
University of Connecticut
2016-present Professor, Department of Orthopaedic Surgery
The University of Chicago

TEACHING/EDUCATIONAL APPOINTMENTS

University of Colorado School of Medicine
Co-Director, Musculoskeletal Block (required 3rd-year course) (2007-2010)
Director, Orthopaedic Medical Student Courses/Sub-Internships (2007-2010)
University of Connecticut School of Medicine
Curriculum Reform Clinical Education Committee (2015-2016)
Medical School Admissions Committee (2014-2016)
Instructor, Musculoskeletal Block (2010-present)
The University of Chicago
Program Director, Hand Surgery Fellowship (2016-present)

HOSPITAL APPOINTMENTS

2003-2010 University of Colorado Hospital
2004-2010 Denver Veterans Administration Medical Center
2004-2010 Denver Health Medical Center
2004-2010 The Children's Hospital of Denver
2005-2010 Rose Hospital (Denver)
2010-2016 John Dempsey Hospital
2014-2016 Connecticut Children's Medical Center
2016-present The University of Chicago Hospital

AWARDS & HONORS

2014 Connecticut Technology Council Women of Innovation Award
2013 American British Canadian Traveling Fellowship – American Orthopaedic Association
2010 Sterling Bunnell Traveling Fellowship –American Society for Surgery of the Hand
2008 Clinician Scientist Award – Orthopaedic Research and Education Foundation
2008 Leadership Fellows Program – American Academy of Orthopaedic Surgeons
2007 John J. Fahey North American Traveling Fellowship –American Orthopaedic Association

2006 American Society for Surgery of the Hand – Young Member Leadership Program
2006 Alexandra Kirkley Traveling Fellowship - Ruth Jackson Orthopaedic Society
2005 United States Bone and Joint Decade Young Investigator
2001 Haffner Award for Resident Research
1996 William G. Munn Memorial Prize for Promise in Orthopaedics
1995 Alpha Omega Alpha Medical Honor Society
1990 Phi Beta Kappa
1987 Chancellor's Scholar (full four-year college merit scholarship)

PROFESSIONAL SOCIETY MEMBERSHIP

American Society for Surgery of the Hand (Active Member, 2007 - present)
American Academy of Orthopaedic Surgeons (Fellow, 2007 – present)
American Orthopaedic Association (Member, 2012-present)
American Association of Hand Surgeons (Member, 2003-present)
Orthopaedic Leadership Institute (2010-present)
Ruth Jackson Orthopaedic Society (2002-present)
Rocky Mountain Hand Surgery Society (2003-present)
Colorado Orthopaedic Society (2004-2010)
Connecticut Orthopaedic Society (2010-present)
New England Orthopaedic Society (2015-present)

JOURNAL REVIEW

Deputy Editor-in-Chief, *Journal of Hand Surgery* (2016-present)
Deputy Editor, *Journal of Hand Surgery* (2011-2015)
Associate Editor, Scientific – *Journal of Hand Surgery* (2009-present)

Associate Editor, Hand and Microsurgery, *Journal of Bone and Joint Surgery Reviews* (2013-present)

Editorial Board, *Orthopedics* (2003-2016)

Web Updates Editor, *Skeletal Trauma* (2008-2016)

Expert Contributor, *British Medical Journal Best Practice* website (2014-present)

Consultant Reviewer

Journal of Bone and Joint Surgery (2007-present)
Journal of Hand Surgery (2008-2009)
Journal of Bone and Joint Surgery – British (2009-present)
Clinical Orthopaedics and Related Research (2007-present)
Orthopedics (2003-present)
Hand (2010-present)
British Journal of Sports Medicine (2013-present)
International Journal of Sports Medicine (2012-present)
BMC Musculoskel Disorders (2014-present)

Osteoarthritis Cartilage (2015-present)
Arthritis Care and Research (2015-present)

Editor, Hand Module, *Orthopaedic Hyperguide* (2008-2011)

COMMITTEES/SERVICE

American Society for Surgery of the Hand

Council Member-at-Large (2014-2017)
Program Co-Chair, Annual Meeting (2014)
Annual Meeting Committee (Co-Chair, 2016-2018)
Publications and Products Committee (2015-2016)
Membership Application Task Force (2015)
CME Guidelines Task Force (2015)
Commercial Support Committee (2012-2015)
Touching Hands Project (2012-2015)
Bunnell Traveling Fellowship Committee (2010-2013; Chair, 2013-2014)
Products and Publications Committee (2005-2011)
Annual Meeting Scientific Displays Committee (Member, 2006-2015; Chair, 2009-2012)
Mentoring Task Force (2006)
Resident Education Committee (2007-2010)
Crucial Elements of Hand Surgery Committee (2007-2008)
Courses and Meetings Advisory Committee (2007-2010)
Young Members Steering Committee (Member, 2008-2010; Chair 2010-2011)
Diversity Committee (2008-2011)
Membership Task Force (2009)

American Foundation for Surgery of the Hand

Board Member-at-Large (2012-2014)
Complus Manus Committee (2012-2014)
Nominating Committee (2012-2013)
Touching Hands Project (2012-2013)

American Academy of Orthopaedic Surgeons

Chair, Residents, Fellows, and Candidate Members Subcommittee (2008-2011)
Member (2006-2009)
Co-Editor, Residents' Monthly E-Newsletter (2007-2009)
Co-Chair, Leadership Development Endowment Fund Meeting Committee (2010-2012)

American Board of Orthopaedic Surgeons/National Board of Medical Examiners

Oral Boards Examiner (2015)
Joint Committee for CAQ Question-Writing Task Force (2011-2015)

Orthopaedic Research and Education Foundation

Grant Reviewer (2010-present)

Ruth Jackson Orthopaedic Society Governing Board

President (2014-2015)
Vice- President (2013-2014)
Secretary (2011-2013)

Chair, Nominating Committee (2015)

Orthopaedic Leadership Institute
Inaugural Meeting Program Coordinator (2011)

American Association of Hand Surgery
Research Committee (2008-2011)

Board of Directors, Rocky Mountain Hand Surgery Society (2008-2011)
Secretary/Treasurer (2008-2009)
Vice President (2009-2010)

New England Hand Society (2011-present)

Department of Orthopaedic Surgery, University of Connecticut
Research Committee (2011-present, Chair 2012-present)
Admissions Committee member (2010-present)
OR Lean Committee (2014-15)

Colorado Multiple Institutions Review Board (IRB) reviewer, 2004-2008

Faculty Advisor, Orthopaedic Student Interest Group, University of Colorado School of Medicine, 2008-2010

Department of Orthopaedics, University of Colorado
Finance Committee member, 2006-2010
Academic Council member, 2007-2010
Curriculum Committee member, 2006-2010

University of Colorado Hospital Trauma Committee member, 2004-2010

Active Women's Health Initiative, University of Colorado Hospital, 2004-2010

PEER-REVIEWED PUBLICATIONS

1. **Moriatis JM**, Gannon FH, Shore EM, Bilker W, Zasloff MA, Kaplan FS: Limb swelling in patients who have fibrodysplasia ossificans progressiva. *Clin Orthop Rel Res* 336: 247-253, 1997.
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11. Ryzewicz MA, **Wolf JM**: Trigger digits: review, management, and complications. *J Hand Surg Am*, 31A: 135-146, 2006.
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NON-PEER REVIEWED PUBLICATIONS

1. Kaplan FS, Glaser DL, Shore EM, Emerson S, Mitchell D, **Wolf JM**, and the FOP Clinical Consortium: Medical management of fibrodysplasia ossificans progressiva: current treatment considerations. *Clin Proc Third Intl Symp FOP* 1: 1-52, 2001.
2. **Wolf JM**: *Editorial*: The genetic key to a rare disease and its impact on orthopaedics. *Orthopedics* 29:1, 2006.
3. **Wolf JM**, Athwal GS, Hoang B, Mehta S, Owens BD. Report from the 2007 AOA North American Traveling Fellowship. *J Bone Joint Surg Am* 90(5):1160-1164, 2008.
4. **Wolf JM**. Web commentary on: Pyrolytic carbon resurfacing arthroplasty for osteoarthritis of the proximal interphalangeal joint. *J Bone Joint Surg Am*, 2011.
5. **Wolf JM**. *Editorial*: New iPad App for the Journal of Hand Surgery, *J Hand Surg*, 37 (9): 1763-1764, 2012.
6. **Wolf JM**. *Editorial*: Do we need to treat tennis elbow? *Orthopedics* 35(11): 921-922, 2012.
7. Scher DL, Ferreira JD, Cote ML, Abdelgawad A, **Wolf JM**. *Editorial*: The need for musculoskeletal education in primary care residencies. *Orthopedics*, 37(8): 511-513, 2014.
8. **Wolf JM**. *Editorial*: Raising the bar: the use of standardized reporting outcomes. *J Hand Surg* 39(10):1905-1906, 2014.

ELECTRONIC MEDIA

1. **Wolf JM**, Lawson AB, Mallette P, Leppek N, Spitzer VM: Wrist and Carpal Anatomy section, *The Fractured Wrist*, Instructional DVD-video, American Academy for Orthopaedic Surgeons, 2008.
2. **Wolf JM**. Injection of the digital flexor. WebMD article, www.emedicine.com, 2008.
3. Owens BD, **Wolf JM**, Murphy T. Lateral epicondylitis. WebMD article, www.emedicine.com, 2008.
4. Scher DL, **Wolf JM**: Lateral elbow tendinopathy. American Academy of Orthopaedic Surgeons Web site: Orthopaedic Knowledge Online 2011;9(9): http://orthoportal.aaos.org/oko/abstract.aspx?article=OKO_HAN031.

TEXTBOOK CHAPTERS

1. **Moriatis JM**, Zackai E, Kaplan FS: Skeletal dysplasia and dwarfism: physiology and pathophysiology. *In* Fetal and Neonatal Physiology, Vol. II, 2nd edition. W. B. Saunders, 1995.
2. **Wolf JM**, Weiss APC: Arthroplasty of the hand. *In* Operative Orthopaedics, 3rd edition. Chapman MW, ed. J.B. Lippincott Company, 2000.
3. Hayes E, Carney K, **Wolf JM**, Smith J, Akelman E: Carpal tunnel syndrome. *In* Rehabilitation of the Hand and Upper Extremity, 5th edition. Mosby, Inc, 2002.
4. **Wolf JM**. Dupuytren's disease. *In* Hand Surgery, 1st edition. Berger RA, Weiss APC, eds. New York: Lippincott, Williams & Wilkins, 2004.
5. **Wolf JM**, Shin AY: Proximal row carpectomy. *In* Operative Techniques in Hand and Wrist Surgery. Chung KC, ed. Philadelphia: Elsevier, 2007.
6. **Wolf JM**, Shin AY: Carpal anatomy. *In* Distal Radius Fractures and Carpal Injury: The Cutting Edge. Slutsky D, ed. Philadelphia: Elsevier, 2008.
7. D'Ambrosia P, **Wolf JM**: Metacarpophalangeal and carpometacarpal fractures and dislocations. *In* Master Skills: Fractures. Budoff JE, ed. American Society for Surgery of the Hand, 2008.
8. **Wolf JM**, Shin AY: Radius/Carpus/DRUJ - Bones and ligaments. *In* Principles and Practice of Hand Surgery. Slutsky D, ed. Philadelphia: Elsevier, 2008.
9. **Wolf JM**. Cross-finger flaps. *In* Flap Reconstruction of the Upper Extremity: A Master Skills Publication. Rayan GH, Chung KC, eds. American Society for Surgery of the Hand, 2009.
10. **Wolf JM**. Lateral and medial epicondylitis. *In* Pocket Book of Hand Surgery. Boyer MI, ed. American Society for Surgery of the Hand, 2010.
11. **Wolf JM**. Options in failed tendon transfers. *In* Reoperative Hand Surgery. Duncan S, ed. New York: Springer, 2011.
12. Scher DL, **Wolf JM**. Ligament injuries in the hand and wrist. *In* Musculoskeletal Examination of the Elbow, Wrist and Hand. Culp RW, Katolik LI, eds. Philadelphia: SLACK Inc., *in press*.
13. Gerhardt D, **Wolf JM**. Lateral epicondylitis. *In* Evaluation and Management of Common Upper Extremity Disorders. Rohde RE, Millett P, eds. Philadelphia: SLACK Inc., 2011.
14. Young L, **Wolf JM**. Carpometacarpal arthrodesis. *In* Arthritis of the Hand and Upper Extremity. Glickel SZ, Bernstein RA, eds. Chicago: ASSH, 2011.
15. Scher DL, **Wolf JM**. Lateral elbow tendinopathy. *In* Orthopaedic Knowledge Update/Online. Rayan GH, Grana W, eds. Chicago: AAOS, 2011.

16. **Wolf JM.** The perionychium: anatomy and pathophysiology. *In* The Hand: Examination and Diagnosis, 4th edition. Rayan GH, Akelman E, eds. Chicago: ASSH, 2011.
17. **Wolf JM.** History taking and examination of the hand. *In* The Hand: Examination and Diagnosis, 4th edition. Rayan GH, Akelman E, eds. Chicago: ASSH, 2011.
18. **Wolf JM.** Hand and finger contracture. *In* The Hand and Upper Extremity Surgery Textbook. Weiss APC, Berger RA, Slutsky D, Goldfarb CA, eds. Chicago: ASSH, 2013.
19. Scher DL, **Wolf JM.** General medical conditions. *In* The Hand and Upper Extremity Surgery Textbook. Weiss APC, Berger RA, Slutsky D, Goldfarb CA, eds. Chicago: ASSH, 2013.
20. **Wolf JM.** Elbow Tendinopathies and Bursitis. *In* DeLee and Drez: Sports Medicine. Miller M, ed. Philadelphia: Elsevier Inc, 2014.
21. **Wolf JM.** Distal radius fractures: fixation of intraarticular fracture with volar plate. *In* Distal Radius Fractures. Lawton J, ed. Philadelphia: Springer Inc, 2015.
22. Marchese J, **Wolf JM.** Closed pinning of metacarpal neck/shaft fractures. *In* Case Competencies in Orthopaedic Surgery. Frank R, Provencher MT, Forsythe B, eds. Philadelphia: Elsevier Inc, 2015.
23. Dukas A, **Wolf JM.** Management of complications of periarticular fractures of the DIP, PIP, MCP, and CMC joints. *In* Complications of Hand Fractures. Chung KC, ed. Philadelphia: Springer Inc, 2016.
24. Yoshida R, **Wolf JM.** Thumb CMC arthroplasty. *In* Hand Surgery Update IV. Murray PM, Hammert WR, eds. Chicago: ASSH, 2016.
25. **Wolf JM.** Lateral and medial epicondylitis. *In* Advanced Reconstruction Series: Elbow. Ring D, ed. Chicago: AAOS, *in press*, 2016.
26. Pensak M, **Wolf JM.** Soft tissue problems. *In* Orthopaedic Revision, Della Rocca G, ed. Springer, *in press*, 2016.
27. Scher DL, **Wolf JM,** Nesti L. Hand, wrist, and elbow injuries. *In* Musculoskeletal Injuries in the Military. Owens BD and Cameron KL, eds. Springer, *in press*, 2016.
28. Yoshida R, **Wolf JM.** Benign tumors of the skin. *In* Tumors of the Hand and Upper Extremity. Kakar S, Murray P, eds. American Society for Surgery of the Hand. *In press*, 2016.
29. Kozlowski R, **Wolf JM.** Basilar thumb arthritis. *In* Chapman's Comprehensive Orthopaedics, 4th edition. Chapman MW, James M, eds. Philadelphia: JP Medical Publishers, *in press*, 2016.
30. Suh N, **Wolf JM.** Hand and wrist reconstruction. *In* Orthopaedic Knowledge Online 12. Ring DR, ed. Chicago: American Academy of Orthopaedic Surgeons, *submitted*, 2015.

TEXTBOOKS

1. Cannada L, **Wolf JM**, co-editors: *Guide for Women in Orthopaedic Surgery*. Ruth Jackson Orthopaedic Society, 2015.

2. **Wolf JM**, Editor, *Tennis Elbow: Clinical Management*. Springer: New York, 2015.

RESEARCH SUPPORT

PEER-REVIEWED

CURRENT

1. Wolf (PI) 9/1/14-5/1/16 \$20,000 3% effort
American Foundation for Surgery of the Hand
Conditional Deletion of Relaxin Receptor in Ligament: In Vivo Model
We will create a transgenic mouse with inducible deletion of relaxin receptor at the level of tendon and ligament using a cross of relaxin null and scleraxis-Cre mice.
2. Wolf (PI) 10/7/14-10/6/17 \$750,000 10% effort
Department of Defense/Congressionally Directed Medical Research Program
Supplementation of Vitamin D in Prevention of Post-Traumatic Osteoarthritis: Animal and Clinical Models
This project will study the impact of oral Vitamin D in prevention of surgically induced arthritis in a murine model, as well as evaluate Vitamin D levels in military cadets prior to and after ACL injury.
3. Wolf (PI) 7/1/14-6/30/15 \$50,000 5% effort
Orthopaedic Research and Education Foundation/Goldberg Arthritis Grant
Animal Model of Vitamin D Supplementation for Prevention of Osteoarthritis
This project evaluates the potentially preventive impact of Vitamin D oral supplementation on the initiation and development of surgically induced osteoarthritis in mice.
Awarded but declined due to overlap with DOD/CDMRP grant above.

COMPLETED

1. Chung (PI) 06/01/2011-05/30/2016 \$22,500 3% effort
NIH/NIAMS RO1. WRIST Study Group
A clinical trial for the surgical treatment of elderly distal radius fractures
This multicenter randomized trial compares 3 different methods of fixation in surgically treated distal radius fractures in elderly patients.
Role: Co-investigator, PI on subcontract

2. Wolf (PI) 9/14/13-09/13/15 \$20,000 3% effort
American Foundation for Surgery of the Hand
Impact of local and systemic relaxin in a murine osteoarthritis model
This study uses a murine model to examine the impact of locally and systemically delivered relaxin on the development of surgically induced osteoarthritis.
3. Rozental (PI) 05/01/2012-04/30/2013 \$45,000 3% effort
Orthopaedic Research and Education Foundation/RJOS/DePuy
Markers of bone turnover and Vitamin D in patients with distal radius fractures
This study expands the smaller pilot study to evaluate biomarkers of bone turnover and 25-hydroxy-Vitamin D in patients with distal radius fractures, compared to controls.
Role: Co-Investigator
3. Wolf (co-PI) 09/01/11-08/31/12 \$20,000 3% effort
American Foundation for Surgery of the Hand
25-Hydroxy-Vitamin D and bone turnover marker levels in patients with distal radius fractures
This study will evaluate Vitamin D and biomarkers of bone turnover in patients with wrist fractures and controls.
Role: co-PI
4. Wolf (PI) 08/20/10-06/01/11 \$20,000 3% effort
University of Connecticut GCRC/CICATS Pilots and Feasibility Funds-2010
Correlation of serum relaxin with joint mobility and ligament injury and analysis for gender differences
This study will correlate serum relaxin with a prospective injury database in military cadets.
Role: PI
5. Wolf (PI) 09/01/08-08/31/10 \$20,000 3% effort
American Foundation for Surgery of the Hand
Effect of relaxin on gender differences in laxity and arthritis of the thumb base
This study will evaluate hormonal effects on gender differences in thumb laxity and osteoarthritis.
Role: PI
6. Wolf (PI) 07/01/08-06/30/11 \$300,000 15% effort
Orthopaedic Research and Education Foundation Clinician-Scientist Award
Does relaxin mediate gender differences in joint laxity and osteoarthritis of the thumb carpo-metacarpal joint?
This study's goal is to correlate serum relaxin levels and joint laxity in normal subjects as well as to evaluate this relationship in patients with surgically treated thumb CMC osteoarthritis.
Role: PI
7. Wolf (PI) 10/01/06-09/30/08 \$20,000 3% effort
American Foundation for Surgery of the Hand
A prospective, randomized, controlled trial of autologous blood injection vs. corticosteroid injection for the treatment of lateral epicondylitis.
This is a prospective, blinded, multicenter trial to evaluate the efficacy of autologous blood injection for lateral epicondylitis.

Role: PI

8. Dawson (PI) 2/01/08-1/31/09 \$1000 2% effort
Southwest Orthopaedic Trauma Association
Incidence of scaphoid fractures in a young, active population.
This study uses a military database of healthcare visits coded by ICD-9 to calculate the incidence of scaphoid fracture in a young, active population as well as analyze potential demographic risk factors for this injury.
Role: Co-investigator
9. Sobky (PI) 07/01/04-06/30/05 \$5,000
Department of Orthopaedics, University of Colorado Health Sciences Center
Comparison of bending strength and load to failure of multiple volar plates.
This was a biomechanical study of the strength and stiffness of multiple plates used for fixation in distal radius fractures.
Role: Co-investigator
10. Wolf (PI) 07/01/94-06/30/95 \$20,000
American Heart Association
Sequencing of bone morphogenetic proteins and effects on human osteoblast-like cells.
This was a project to evaluate the effect of BMP-2 and BMP-4 on osteoblasts in culture.
Role: PI

NON-PEER-REVIEWED

1. Wolf (PI) 01/01/04-04/01/06 \$20,000
Orthologic, Inc., Phoenix, Arizona
A double-blind, randomized, placebo-controlled Phase III study to evaluate the efficacy and safety of Chrysalin on the rate of healing in distal radius fractures.
This was a multicenter trial of an injectable substance with the goal to increase healing in distal radius fractures.
Role: PI

INVITED PRESENTATIONS and LECTURES (National/International)

1. Metacarpal and Phalangeal Fractures: *Operative Treatment of Phalangeal Fractures*. Instructional Course Lecture, AAOS Annual Meeting. February 2007, San Diego, CA.
2. Trapeziometacarpal Arthritis and Other Degenerative Arthropathies of the Hand: *Evidence-Based Treatment*. Instructional Course Lecture, ASSH Annual Meeting, September 2007, Seattle, WA.
3. Kienbock's Disease: *Cases and Discussion*. Interactive Case Review, ASSH Annual Meeting, September 2007, Seattle, WA.
4. Lateral Epicondylitis: Evidence-Based Treatment in 2007. *North American Traveling Fellowship Lecture*. University of Maryland, October 5, 2007. Dalhousie University, Halifax, October 10, 2007. University of Rochester, October 17, 2007. Boston University Medical Center, October 22, 2007. Brown University, October 24, 2007. Emory University, November 1, 2007.

5. Current Trends in the Fixation of Distal Radius Fractures. *North American Traveling Fellowship Lecture*. McGill University, Montreal, October 12, 2007. Dartmouth-Hitchcock Medical Center, October 17, 2007. Massachusetts General Hospital, October 17, 2007. University of Miami Medical Center, October 29, 2007.
6. The Visible Hand: Anatomy and Virtual Surgery. *North American Traveling Fellowship Lecture*. Carolinas Medical Center, October 1, 2007. Rothman Institute, October 8, 2007. Sacre-Coeur Hospital, University of Montreal, October 16, 2007. University of Rochester, October 18, 2007.
7. Dupuytren's Disease: Outcomes and Evidence. *North American Traveling Fellowship Lecture*. Maisonneuve-Rosemont Hospital, University of Montreal, October 18, 2007. University of Florida-Jacksonville, October 31, 2007.
8. Current Trends in the Fixation of Distal Radius Fractures. Howard Rosen Tri-State Trauma Symposium, Hospital for Joint Diseases, New York, New York, October 19, 2007.
9. Acute Trauma to the Upper Extremity: What to Do and When to Do It: *The Wrist*. Instructional Course Lecture, AAOS Annual Meeting, San Francisco, California, March 2008.
10. Metacarpal and Phalangeal Fractures: *Treatment of Metacarpal Shaft Injuries and Carpometacarpal Fracture-Dislocations*. Instructional Course Lecture, AAOS Annual Meeting, March 2008, San Francisco, California.
11. Trends and Outcomes in the Fixation of Distal Radius Fractures & Gender Differences in Thumb Carpometacarpal Arthritis. *Visiting Professor: Grand Rounds*, Texas Tech University/William Beaumont Army Medical Center, July 9, 2008, El Paso, Texas.
12. The Minimum Surgical Experience. Resident Educators' Workshop, American Society for Surgery of the Hand Annual Meeting, Chicago, Illinois, September 2008.
13. Tendinopathies of the Hand and Dupuytren's Contracture. Hand Review Course, American Association of Hand Surgeons Annual Meeting, January 9, 2008, Maui, Hawaii.
14. Elbow Dislocations: Back to the Basics: *Simple Elbow Dislocations*. Instructional Course Lecture, AAOS Annual Meeting, February 2009, Las Vegas, Nevada.
15. Acute Trauma to the Upper Extremity: What to Do and When to Do It: *The Wrist*. Instructional Course Lecture, AAOS Annual Meeting, February 2009, Las Vegas, Nevada.
16. Hormonal Influences in Thumb Arthritis. Research Lecture, University of Virginia, April 18, 2009, Charlottesville, Virginia.
17. Tendon Biology. ASSH Master Skills Course: Tendon Repair and Reconstruction. Chicago, Illinois, October 16-17, 2009.

18. Current Treatment Strategies in Arthritis of the Basilar Thumb Joint: *Nonoperative Treatment and Pantrapezial Osteoarthritis*. Symposium, AAOS Annual Meeting, March 2010, New Orleans, Louisiana.
19. Elbow Dislocations: Back to the Basics: *Simple Elbow Dislocations*. Instructional Course Lecture, AAOS Annual Meeting, March 2010, New Orleans, Louisiana.
20. The Influence of Joint Laxity and Hormones on Gender Differences in Thumb Carpometacarpal Arthritis. Grand Rounds Speaker, Columbia University Dept. of Orthopaedic Surgery, May 27, 2010, New York, New York.
21. The Use of Steroid and Hyalgan Injections for Trapeziometacarpal Arthritis. ASSH Precourse, ASSH Annual Meeting, October 7, 2010, Boston, Massachusetts.
22. Lateral Epicondylitis Treatment in 2010, Grand Rounds Speaker, University of Michigan Dept. of Plastic Surgery, November 2, 2010, Ann Arbor, Michigan.
23. Hormonal Influences on Gender Differences in Basilar Thumb Arthritis. Grand Rounds Speaker, Stanford University Dept. of Orthopaedic Surgery, January 19, 2011, Palo Alto, California.
24. Gender and Hormones in Carpometacarpal Joint Arthritis of the Thumb. Grand Rounds Speaker, University of Massachusetts Dept. of Orthopaedic Surgery, January 26, 2011, Worcester, Massachusetts.
25. Acute and Chronic Management of Mallet Injuries. ASSH Specialty Day, AAOS Annual Meeting, February 19, 2011, San Diego, California.
26. Thumb CMC Arthritis: A Survey of US Hand Surgeons. Japanese Society of Hand Surgery Annual Meeting (held online), May 2011, Aomori, Japan.
27. Hormonal Influences on the Development of Trapeziometacarpal Arthritis. Department of Rheumatology Rounds, Landspítali Hospital/University of Iceland, June 7, 2011, Reykjavik, Iceland.
28. Acute and Chronic Scapholunate Ligament Injury. Invited Speaker, Department of Orthopaedic Surgery, Landspítali Hospital/University of Iceland, June 8, 2011, Reykjavik, Iceland.
29. Lateral Epicondylitis: Treatment of a Difficult Problem. Invited Speaker, Orkuhusid Orthopaedic Clinic, June 8, 2011, Reykjavik, Iceland.
30. Limited Incisions – Volar and Radial for Distal Radius Fractures. Wrist Injuries: State-of-the-Art, Orthopaedic Learning Center, June 24, 2011, Rosemont, Illinois.
31. Decision-Making in Post-Traumatic Arthritis of the Wrist. Wrist Injuries: State-of-the-Art, Orthopaedic Learning Center, June 25, 2011, Rosemont, Illinois.
32. Upper Extremity Trauma. Hassleholm Hospital Orthopaedic Conference, August 22, 2011, Hassleholm, Sweden.

33. Hormonal Influences on Basilar Thumb Joint Laxity. Lund University Hand Conference, August 23, 2011, Lund, Sweden.
34. Hormones as Etiology for Thumb Arthritis. The Thumb CMC Joint: Anatomy, Hormones, Biomechanics - and a Surgery Wish List. Symposium, AAOS Annual Meeting, February 2012, San Francisco, California.
35. Hormonal Influences on the Basilar Thumb Joint. Sex, Bones, and Women. Symposium, AAOS Annual Meeting, February 2012, San Francisco, California.
36. Fragility Fractures of the Upper Extremity: What Every Hand Surgeon Should Know. Instructional Course Lecture, American Society for Surgery of the Hand Annual Meeting, September 2012, Chicago, Illinois.
37. Lateral Epicondylitis: Doing Something vs. Nothing. Symposium Moderator, American Society for Surgery of the Hand Annual Meeting, September 2012, Chicago, Illinois.
38. Evidence Based Medicine 2012 - The Use of Evidence in Daily Practice. Symposium, American Society for Surgery of the Hand Annual Meeting, September 2012, Chicago, Illinois.
39. Fast and Furious: Thumb CMC Arthritis in 5-Minute Bullets. Symposium, American Society for Surgery of the Hand Annual Meeting, September 2012, Chicago, Illinois.
40. Highlighting the Achievements of the American Foundation for Surgery of the Hand (AFSH). Symposium, American Society for Surgery of the Hand Annual Meeting, September 2012, Chicago, Illinois.
41. Hand Fractures: Techniques and Complications. Current Concepts in Upper Extremity Injury and Reconstruction Course, November 2012, Atlanta, Georgia.
42. CMC and MCP Instability. Current Concepts in Upper Extremity Injury and Reconstruction Course, November 2012, Atlanta, Georgia.
43. Hypermobility and Orthopaedic Surgery. *ABC Traveling Fellowship Lecture*. Royal National Orthopaedic Hospital, Stanmore, UK, April 25, 2013. Nuffield Orthopaedic Centre, Oxford, UK, April 27, 2013. Lancashire and Wigan Infirmary, Wrightington, UK, May 1, 2013. Sheffield NHS Trust, Sheffield, UK, May 3, 2013. Jubilee National Hospital Centre, Glasgow, UK, May 7, 2013.
44. Lateral Epicondylitis: To Treat or not to Treat in 2013? *ABC Traveling Fellowship Lecture*. Royal Orthopaedic Hospital, Birmingham, UK, April 29, 2013. Edinburgh Royal Infirmary, May 5, 2013. Newcastle/Northumbria NHS Trust, May 6, 2013. University of Pretoria, Pretoria, South Africa, May 14, 2013. Kwazulu-Natal University Hospital, May 16, 2013. University of Cape Town/Stellenbosch University Combined Program, May 22, 2013.
45. Simple Elbow Dislocations: Epidemiology and Treatment. *ABC Traveling Fellowship Lecture*. Medunsa Orthopaedic Hospital, Limpopo, South Africa, May 15, 2013. Bloemfontein University Hospital, Bloemfontein, South Africa, May 21, 2013.

46. Failed Thumb CMC Arthroplasty. Israeli Society for Surgery of the Hand, November 27, 2013, Tel Aviv, Israel.
47. Current Trends in Thumb CMC Arthroplasty. Israeli Society for Surgery of the Hand, November 27, 2013, Tel Aviv, Israel.
48. Lateral Epicondylitis & Mallet Finger Deformity, Electives in Hand Surgery, New Orleans, Louisiana, February 7-8, 2014.
49. Thumb CMC Arthritis: Epidemiology, Hormones, Treatment. Grand Rounds Speaker, University of Rochester. Rochester, New York, August 24, 2014.
50. Owning Osteoporosis Care in Your Practice. Instructional Course Lecture, American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans, LA, February 2015.
51. Hand and Wrist Injuries in Gymnasts. Italian Society for Surgery of the Hand. Viterbo, Italy. October 8-10, 2015.
52. Quality Is in the Eye of the Beholder: What's Measured, What Matters, and How Do We Reconcile This? Symposium, American Academy of Orthopaedic Surgeons Annual Meeting, March 10, 2016, Orlando, Florida.
53. Ulnar Collateral and Radial Collateral Ligament Repair and Reconstruction. AAOS Complex Wrist and Hand Trauma Course, April 15, 2016, Rosemont, Illinois.
54. Radial Tunnel Syndrome. . AAOS Complex Wrist and Hand Trauma Course, April 15, 2016, Rosemont, Illinois.

NATIONAL/INTERNATIONAL PRESENTATIONS

1. **Wolf JM**; Gannon FH; Shore EM; Bilker W; Zasloff MA; Kaplan FS: The prevalence, natural history, and pathogenesis of limb swelling in patients who have fibrodysplasia ossificans progressiva. Adult Bone and Mineral Working Group, American Society for Bone and Mineral Research Annual Meeting; September 10, 1995, Baltimore, Maryland. (podium)
2. **Wolf JM**; Gannon FH; Shore EM; Bilker W; Zasloff MA; Kaplan FS: Limb swelling in patients who have fibrodysplasia ossificans progressiva. Second International Symposium on Fibrodysplasia Ossificans Progressiva; October 30-31, 1995, Philadelphia, Pennsylvania. (podium)
3. **Wolf JM**; Weiss APC: Complications of wrist arthroscopy. American Academy of Orthopaedic Surgeons Annual Meeting; March 4, 1999, Anaheim, California. (podium)
4. **Wolf JM**; Weiss APC: A new technique of intercarpal arthrodesis. Adrian Flatt Residents and Fellows Conference, American Society for Surgery of the Hand; October 4, 2000, Seattle, Washington. (podium)
5. Wyman JJ; Greisberg J; **Wolf JM**; Zou L; Terek R: "The effects of gadodiamide on proteoglycan production, cell proliferation, and apoptosis in chondrocytes." Symposium

of the International Cartilage Repair Society, June 16, 2000, Goteborg, Sweden. (podium)

6. **Wolf JM**; Weiss APC; Akelman E: Mini-open carpal tunnel release using a new protective guide and blade system. American Association of Hand Surgery Annual Meeting, January 10-13, 2001, San Diego, California. (poster)
7. **Wolf, JM**; Green A: The effect of co-morbidity on pain, function, and general health status (GHS) associated with idiopathic adhesive capsulitis (IAC). American Academy of Orthopaedic Surgeons Annual Meeting, February 28-March 4, 2001, San Francisco, California. (poster)
8. Greisberg J; **Wolf JM**; Wyman JJ; Terek R: "The effects of gadolinium chelates on articular cartilage." Orthopaedic Research Society, February 25-28, 2001, San Francisco, California. (poster)
9. **Wolf JM**; Meitner PA; Terek RM: The effect of hydrogen peroxide on chondrosarcoma cells: an *in vitro* analysis. Musculoskeletal Tumor Society Annual Meeting, April 25-27, 2002, Toronto, Canada. (podium)
10. **Wolf JM**; DiGiovanni CW: Thromboembolic prophylaxis in patients with foot and ankle trauma. American Orthopaedic Foot and Ankle Society Annual Meeting, July 14-16, 2002, Traverse City, Michigan. (podium)
11. **Wolf JM**, Meitner PM, Terek RM: Hydrogen peroxide as a potential adjuvant therapy for chondrosarcoma. Orthopaedic Research Society Annual Meeting, February 2-5, 2003, New Orleans, Louisiana. (poster)
12. Tashjian RZ, Ritter M, **Wolf JM**, Weiss APC, Green A: Functional outcomes and general health status after ulnohumeral arthroplasty for primary degenerative elbow arthritis. American Shoulder and Elbow Surgeons Focus Meeting, November 14-16, 2003, Las Vegas, Nevada. (podium)
13. Tashjian RZ, Ritter M, **Wolf JM**, Weiss APC, Green A: Ulnohumeral arthroplasty affects functional outcomes and general health status. Ninth International Congress of Shoulder Surgeons, May 3, 2004, Washington, DC. (podium)
14. **Wolf JM**, Shin AY, Moran S, Beckenbaugh RD: Complications of silastic metacarpophalangeal joint arthroplasty. American Society for Surgery of the Hand Annual Meeting, September 9-11, 2004, New York, New York. (poster)
15. **Wolf JM**, Sobky K, Baldini T, Thomas K, Bach J: Biomechanical comparison of different volar plates for fixation of distal radius fractures. American Association for Hand Surgery Annual Meeting, January 11, 2007, San Juan, Puerto Rico. (podium)
16. **Wolf JM**, Scott F, Gordon M, Ozer K, Williams A: Preliminary results of a randomized prospective trial of autologous blood injection for lateral epicondylitis. American Society for Surgery of the Hand Annual Meeting, September 20, 2008, Chicago, Illinois. (podium)

17. **Wolf JM**, Boyer MI. Evaluation of knowledge of common hand surgery problems in internal medicine residents. American Society for Surgery of the Hand Annual Meeting, September 18, 2008, Chicago, Illinois. (poster)
18. **Wolf JM**, Dawson L, Mountcastle SB, Owens BD. Incidence of scaphoid fracture in a young, active population. Orthopaedic Trauma Association Annual Meeting, October 11, 2008, Denver, Colorado. (poster)
19. **Wolf JM**, Athwal GS, Hoang BH, Mehta S, Williams A, Owens BD. Resident knowledge of levels of evidence criteria. American Academy of Orthopaedic Surgeons Annual Meeting, Las Vegas, Nevada, February 25, 2009. (podium)
20. **Wolf JM**, Blonna D, O'Driscoll SW. Prevention of nerve injuries using a safety-driven step-wise technique for arthroscopic capsulectomy of the elbow. American Shoulder and Elbow Society Open Meeting, Las Vegas, Nevada, February 28, 2009. (podium)
21. **Wolf JM**, Williams A, Boyer MI. Prospective Outcomes Assessment in Dupuytren's Contracture Comparing Palmar and Palmo-Digital Fasciectomy. Joint Meeting of the American and British Societies for Surgery of the Hand, London, UK, April 30, 2009. (podium)
22. **Wolf JM**, Athwal GS, Hoang BH, Mehta S, Williams A, Owens BD. Knowledge of levels of evidence criteria in orthopaedic residents. Special Emphasis Poster. American Orthopaedic Association Annual Meeting, Bonita Springs, Florida, June 2009. (poster)
23. Sturdivant R, Burks R, Owens B, **Wolf J**, and Cameron K. Epidemiological studies in the military. Joint Statistical Meeting, Washington, DC, August 5, 2009. (podium)
24. Posner MA, **Wolf JM**, Belmont PJ, Owens BD. Epidemiology of Major League Baseball Injuries. American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans, Louisiana, March 2010. (poster)
25. Van Tassel DC, Owens BD, Pointer L, **Wolf JM**. Incidence and Demographics of Scaphoid Fracture in the United States Population. American Academy of Orthopaedic Surgeons Annual Meeting, New Orleans, Louisiana, March 2010. (poster/alternate podium)
26. Posner MA, **Wolf JM**, Belmont PC, Owens BD. Epidemiology of Major League Baseball injuries. Society of Military Orthopaedic Surgeons Annual Meeting, Honolulu, Hawaii, December 2009. (poster)
27. Posner MA, **Wolf JM**, Belmont PC, Owens BD. Epidemiology of Major League Baseball injuries. Mid-America Orthopaedic Association Annual Meeting, Austin, Texas, April 22, 2010. (podium)
28. Posner MA, **Wolf JM**, Mountcastle S, Belmont PC, Owens BD. Epidemiology of Major League Baseball Injuries. American Orthopaedic Society for Sports Medicine Annual Meeting, Providence, Rhode Island, July 18, 2010. (podium)

29. Schreier S, Williams AE, **Wolf JM**. Relationship between Generalized Hypermobility and Carpometacarpal Radiographic Laxity. American Society for Surgery of the Hand Annual Meeting, Boston, Massachusetts, October 7, 2010. (poster)
30. Stoneback J, Owens BD, Athwal GS, Pointer L, **Wolf JM**. Incidence of Elbow Dislocations in the United States Population. American Academy of Orthopaedic Surgeons Annual Meeting, San Diego, California, February 18, 2011. (poster)
31. Stoneback JW, Owens BD, Sykes JB, Athwal GS, Pointer L, **Wolf JM**. Incidence of Elbow Dislocations in the United States Population. Canadian Orthopaedic Association Annual Meeting. St John's, Newfoundland. July 7-9, 2011. (poster)
32. **Wolf JM**, Scott F, Delaronde S, Williams AE, King KB. Relaxin Upregulates Relaxin Receptor and MMP in the Anterior Oblique Ligament. American Society for Surgery of the Hand Annual Meeting, Las Vegas, Nevada, September 9, 2011. (podium)
33. Mir H, Cannada L, Black KP, Murray J, **Wolf JM**. Orthopaedic Resident and Program Director Opinions of Resident Duty Hours – A National Survey. American Orthopaedic Association Annual Meeting, Washington, DC, June 2012. (special emphasis poster)
34. **Wolf JM**, Scott F, Williams AE, Delaronde S, King KB. Serum Relaxin is Correlated with Relaxin Receptors and MMP-1 in the Anterior Oblique Ligament. 2012 World Congress on Osteoarthritis, Barcelona, Spain, April 26-29, 2012. (poster)
35. Clifton K, Rodner CM, Drissi H, **Wolf JM**. Relaxin Receptors in the Dorsoradial Ligament and Synovium of the Trapeziometacarpal Joint. American Society for Surgery of the Hand Annual Meeting, Chicago, Illinois, September 7, 2012. (podium)
36. **Wolf JM**, Turkiewicz A, Atroshi I, Englund M. Prevalence of Symptomatic Basilar Thumb Joint Osteoarthritis in the General Population. American College of Rheumatology Annual Meeting, Washington, DC, November 12, 2012. (poster)
37. Judson CR, Cote M, Bernstein J, **Wolf JM**. Outcomes of Conservative Therapies for the Treatment of Lateral Epicondylitis with Minimum One Year Follow-up. American Society for Surgery of the Hand Annual Meeting, San Francisco, California, Oct 3-5, 2013. (e-poster)
38. **Wolf JM**. Measuring trapeziometacarpal mobility using stress radiography and its association with generalized hypermobility. International Thumb Osteoarthritis Workshop, Newport, Rhode Island, Oct 23-25, 2013 (podium)
39. Judson C, Cote M, Coyle KM, **Wolf JM**. Outcomes of conservative therapies for the treatment of lateral epicondylitis with minimum one year follow-up. American Society for Surgery of the Hand Annual Meeting, Seattle, Washington. September 8-12, 2014 (poster)
40. Webber T, Patel SP, Pensak M, Fajolu O, Rozental TD, **Wolf JM**. Correlation between distal radius cortical thickness and bone mineral density. Hand Wrist Biomechanics International Meeting, Milan, Italy, June 16, 2015. (podium)

41. Rohde RS, **Wolf JM**, Adams JE. Where are the Women in Orthopaedic Surgery? Special Interest Poster, American Orthopaedic Association Annual Meeting, Providence, Rhode Island, June 24-27, 2015. (poster)
42. Rozental TD, Walley K, Herder L, Coyle K, Buxsein M, **Wolf JM**. 25-Hydroxy-Vitamin D and bone turnover marker levels in patients with distal radius fractures. American Society for Surgery of the Hand Annual Meeting, Seattle, Washington. September 8-12, 2015 (poster)
43. Rohde RS, **Wolf JM**, Adams JE. Where are the Women in Orthopaedic Surgery? American Academy of Orthopaedic Surgeons Annual Meeting, March 2-4, 2016. (poster)
44. Marchese J, Coyle K, Cote M, **Wolf JM**. Prospective evaluation of single corticosteroid injection on outcomes in patients with radial tunnel syndrome. Joint Australian and American Society for Surgery of the Hand Meeting, Sydney, Australia. March 31, 2016. (podium)
45. Webber T, Cote M, **Wolf JM**. Normative values for trapeziometacarpal subluxation on stress view radiographs. American Society for Surgery of the Hand Annual Meeting, Austin, Texas. Sept 27-October 1, 2016. (poster)

COURSE FACULTY

1. Co-director: Hand Anatomy for Hand Therapists Course, May 23, 2004, Englewood, Colorado.
2. Co-director: Hand Anatomy for Hand Therapists Course, April 21, 2006. Englewood, Colorado.
3. Co-Director: Hand Anatomy for Hand Therapists Course, May 10, 2008, Englewood, Colorado.
4. Moderator, Instructional Course Lecture. Acute Trauma to the Upper Extremity: What to Do and When to Do It. American Academy of Orthopaedic Surgeons Annual Meeting, March 6, 2008, San Francisco, California.
5. Moderator, Instructional Course Lecture. Acute Trauma to the Upper Extremity: What to Do and When to Do It. American Academy of Orthopaedic Surgeons Annual Meeting, February 27, 2009, Las Vegas, Nevada.
6. Instructor, ASSH Master Skills Course: Flexor Tendon Repair and Reconstruction. SERC Institute, October 16-17, 2009, Burr Ridge, Illinois.
7. Co-Chair, ASSH Annual Meeting Precourse: Controversies in Hand Surgery: What Works, What Doesn't. ASSH Annual Meeting, October 7, 2010, Boston, Massachusetts.

8. Moderator, ASSH Specialty Day: Finger Fractures Section. AAOS Annual Meeting, February 19, 2011, San Diego, California.
9. Instructor, Orthopaedic Learning Center: Wrist Injuries: State-of-the-Art. AAOS Course Faculty, June 24-25, 2011, Rosemont, Illinois.
10. Moderator, New England Hand Society Annual Meeting: Radial Fracture and Thumb Arthritis Section. December 3, 2011, Sturbridge, Massachusetts.
11. Instructor, Hand Surgery Comprehensive Review Course: Osteoarthritis and Atypical Arthritides. July 15, 2012, Chicago, Illinois.
12. Moderator, ASSH Annual Meeting Symposium: Tennis Elbow: Doing Something vs. Nothing. September 2012, Chicago, Illinois.
13. Instructor, 4th Annual Current Concepts in Upper Extremity Restoration Conference. November 2-3, 2012, Atlanta, Georgia.
14. Co-Moderator, AFSH Grants Symposium. American Society for Surgery of the Hand. October 2013, San Francisco, California.
15. Co-Chair, Interactive Case Reviews, American Society for Surgery of the Hand, October 2013, San Francisco, California.
16. Moderator and Instructor, International Thumb Osteoarthritis Workshop. Clinical vs Research Questions in Thumb Arthritis. October 2013, Newport, Rhode Island.
17. Program Co-Chair, Annual Meeting, American Society for Surgery of the Hand, September 2014, Boston, Massachusetts.
18. Instructor, Hand Surgery Comprehensive Review Course: Osteoarthritis and Atypical Arthritides. July 2015, Chicago, Illinois.
19. Faculty, Hand Section, New England Orthopaedic Society, May 2015, Rockland, Maine.
20. Faculty, 2nd Annual Course on Wrist Arthroscopy and Arthroplasty, October 10-12, Arezzo, Italy.
21. Faculty, Symposium on PIP Joint Injury; Joint Australian and American Society for Surgery of the Hand Meeting. March 31, 2016, Sydney, Australia.
22. Faculty, AAOS Complex Wrist and Hand Course, April 14-15, 2016. Rosemont, Illinois.
23. Moderator, ASSH Annual Meeting Instructional Course: Seeing the M4 Weakness. October 2016: Austin, Texas.
24. Faculty, ASSH Annual Meeting Symposium: Avoiding Complications of Thumb CMC Surgery. October 2016: Austin, Texas.

25. Co-Chair, Interactive Case Reviews, ASSH Annual Meeting: Thumb CMC Arthritis. October 2016, Austin, Texas.
26. Faculty, Resident Review Course, ASSH Annual Meeting. September 2016, Austin, Texas.

REGIONAL/LOCAL PRESENTATIONS

1. A new technique of open carpal tunnel release. New England Hand Society Annual Meeting, December 1, 2000, Sturbridge, Massachusetts.
2. Access and use of the Internet in a hand surgery population. New England Hand Society, December 7, 2001, Sturbridge, Massachusetts.
3. Osteoporosis and Orthopaedics. Sargent School of Physical Therapy, Boston University, November 6, 2001, Boston, Massachusetts.
4. Foot and Ankle Injuries. Sargent School of Physical Therapy, Boston University, November 13, 2001, Boston, Massachusetts.
5. Triceps Rupture and Reconstruction: Case Report and Review of the Literature. Packard Lecture Presentation, May 19, 2004, Denver, Colorado.
6. Advances in Wrist Arthroscopy. Fall Orthopaedic Summit on Minimally Invasive Surgery, September 15, 2005, Keystone, Colorado.
7. Pyrocarbon in Small Finger Joints. Hand SIG Society, Denver Medical Library, October 19, 2005, Denver, Colorado.
8. Scapholunate Ligament Tears. Doctors Demystify the Wrist 2006, October 21, 2006, Denver, Colorado.
9. Common Problems in Hand Surgery. Physical Medicine and Rehabilitation Conference, February 8, 2007, Denver, Colorado.
10. Ulnar Collateral Ligament Injuries of the Thumb. Doctors Demystify the Thumb 2007, April 21, 2007, Denver, Colorado.
11. Top 10 Issues in Hand Surgery for Primary Care Physicians. Webcast, January 22, 2007, Denver, Colorado.
12. Common Hand Surgery Diagnoses. Physical Medicine and Rehabilitation Conference, January 16, 2008, Denver, Colorado.
13. Hand Surgery as Related to Rheumatology. Rheumatology Teaching Conference, March 23, 2008, Denver, Colorado.
14. Lateral and Medial Epicondylitis. Doctors Demystify the Elbow 2008, April 19, 2008, Denver, Colorado.

15. Issues in Hand Surgery for Primary Care. Physician Assistants Curriculum, April 24, 2008, Denver, Colorado.
16. New Treatments for Dupuytren's Contracture. Hand SIG Society, Denver Medical Library, April 15, 2009.
17. My Aching Hand: Discovery Series. University of Connecticut Health Center, November 9, 2010.
18. Lateral Epicondylitis: Current Treatment in 2012. Clinical Research Center Conference, University of Connecticut Health Center, March 14, 2012.
19. Texting Tendinitis: Discovery Series. University of Connecticut Health Center, December 4, 2012.
20. Common Issues in Hand Surgery: Grand Rounds. Department of Medicine Grand Rounds, University of Connecticut Health Center, April 16, 2015.
21. Lateral Epicondylitis in 2015. New England Orthopaedic Society, May 29, 2015, Rockport, Maine.
22. Unusual Compressive Neuropathies: Hartford Hand Surgery Fellowship Conference, Hartford Hospital. March 10, 2016, Hartford, Connecticut.

PERSONAL

Married to Douglas S. Wolf

2 children

Hobbies: rowing, hiking, running

Volunteer physician at overnight camp (2006-present)

Medical Director, Ramah Rockies Summer Camp (2009-10)

Completed New York Marathon November 6, 2011; Hartford Marathon November 13, 2014.

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13. SUPPLEMENTARY NOTES					
14. ABSTRACT The purpose of this study is to evaluate the impact of Vitamin D in prevention and progression of post-traumatic osteoarthritis (PTOA). The animal portion of this study involves surgical induction of osteoarthritis in mice, with supplementation of varying levels of Vitamin D, and evaluation using histology and micro-CT. The clinical portion is an add-on study at the United States Military Academy, evaluating a clinical cohort of USMA cadets treated for anterior cruciate ligament (ACL) tear, with pre- and post-injury serum 25-hydroxy-Vitamin D levels and correlation with joint space narrowing and biomarkers of cartilage injury. Findings from the animal model show preliminary evidence that Vitamin D supplementation may decrease OA in female animals, with less severe micro-CT imaging and histologic changes in animals given supraphysiologic doses of oral Vitamin D. Micro-computed tomography analysis is ongoing and immunohistochemistry is pending. In the clinical portion, we have enrolled 55/100 (55%) of the required patients for the clinical study, but will evaluate serum 25-hydroxy-Vitamin D once the entire cohort is enrolled. Our findings provide preliminary support for the concept that Vitamin D supplementation could prevent the onset of often rapid joint destruction that occurs with PTOA, with important implications for high-risk military occupations.					
15. SUBJECT TERMS Murine, post-traumatic osteoarthritis, military, ACL, knee, medial meniscus, femoral, tibial, 25-hydroxy-Vitamin D, supplementation					
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